IN THE DRAWINGS:

See the attached drawing Replacement Sheet for Figure 10.

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REMARKS

Applicant appreciates the Examiner's diligence in reviewing the specification, claims and drawings, and has attempted to respond to his suggestions.

If there are any further questions, the undersigned attorney would appreciate a telephone conference.

The present invention provides a particulate matter analyzer and system that is capable of automatically collecting a predetermined size range of particles from a sampling fluid on a reinforced porous filter, and then subsequently performing a continuous measurement of both mass and compensation of the particular matter, while preserved on the filter. The porous filter material has been chosen to prevent interference with the subsequent measurements taken to determine both mass and composition. Additionally, the filter material can include a calibration reference material to enable a calibration of the instrumentation.

Previously, conventional filters have used glass fiber of sufficient mechanical strength for collecting particulate matter. Problems have occurred, however, because glass fiber has usually been produced from material containing various components such as silicon, sodium, zinc, etc., and when composition analysis was carried out by the use of x-rays on any particular matter collected on the filter, the composition of the material and the glass fiber would also be detected, thereby creating an ambiguity as to the composition of the sample.

Filters using a fluororesin material have also been utilized, but have limited strength characteristics and are generally unsuitable to be used in a measurement instrument that would permit a filter material to be wound on a tape or roll and intermittently dispensed for measurement purposes. See for example EP 1 142 701 attached hereto.

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The present invention is particularly designed for collecting suspended particulate matter of a very small size over extended time periods, for example, pollution in the atmosphere or in various exhaust gases. It is necessary to collect a meaningful sample over a predetermined time period and to analyze not only the total weight (mass or concentration), but the individual components contained in the sample in an accurate manner. For example, suspended particulate matter having a diameter of 10 micrometers or less can impair human health and such particular matter having a diameter of 2.5 micrometers or less can be particularly injurious to humans.

It is also important that the filter material be relatively insensitive to electrification, thereby avoiding the disadvantage of absorbing unwanted material together with the collected particulate material. It is also important that the filter material be relatively transparent when irradiated with radiation such as x-rays and beta-rays.

The present invention addresses the deficiencies in the prior art by providing a filter material in a measurement system that can have sufficient strength to enable the collection of particulate matter and the subsequent movement of the filter material, for example by a takeup roller, to enable measurements to be performed on the particular material while it is still deposited on the filter.

As can be appreciated, these measurements can be predetermined over certain time periods and the collections of samples and the subsequent testing can be done automatically with a retention of the specimens, for example in the rolled tape, for collaboration of the measurements, see Exhibit A (attached hereto) of a requested set of seven measurements taken on a single roll of tape of four centimeters in width over predetermined measurement collection periods.

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As can be determined from the collection of references cited, this is not only an important field, but a number of very skilled engineers and scientists have spent a considerable period of time in attempting to improve on such instrumentation. Accordingly, the novelty of the present invention must be waived on the basis of such a crowded field.

> "Thus when differences that may appear technologically minor nonetheless have a practical impact, particularly in a crowded field, the decision-maker must consider the obviousness of the new structure in this light."
>
> *Continental Can Co. USA Inc. v. Monsanto Co.*, 20 U.S.P.Q. 2d. 1746, 1752 (Fed. Cir. 1991).

The Office Action rejected Claims 1-3, 5, 6 and 14-16 as being obvious over the *Fischer* German DE 4434222 publication in view of the *Volkwein et al* (U.S. Patent No. 6,401,520) and the *Thomson et al* (U.S. SIR H188).

Basically, the *Fischer* reference was relied upon to teach basic features of the invention with the exception of the particular measuring of mass and analyzing of a composition of the particulate material. *The Volkwein et al* reference was cited for measuring mass, and the *Thomson et al* reference was cited for analyzing the composition.

As can be appreciated, in applying a number of references under 35 U.S.C. §103, it is important to define a teaching reference. In this regard, focusing on the problems faced by the current inventors and comparing it with the problems addressed by the cited references, can be a useful guide for determining the scope and content of the prior art.

In *Orthopedic Co., Inc. v. United States*, 217 USQP 193 (C.A.F.C. 1983), the Federal Circuit set forth a useful guide for determining the scope and content of the prior art. *Orthopedic*, at pages 196-197, also focuses on the "problem" faced by the inventors:

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> In determining the relevant art. . . one looks at the nature of the problem confronting the inventor.
>
> * * *
>
> [W]ould it then be nonobvious to this person of ordinary skill in the art to coordinate these elements in the same manner as the claims in suit? The difficulty which attaches to all honest attempts to answer this question can be attributed to the strong temptation to rely on hindsight while undertaking this evaluation. It is wrong to use the patent in suit [the patent application before the Examiner] as a guide through the maze of prior art references, combining the right references in the right way so as to achieve the result of the claims in suit. Monday morning quarterbacking is quite improper when resolving the question of nonobviousness. (Emphasis added)

The mere fact that the prior art *may* be modified in the manner suggested by the Examiner does not make the modification obvious unless the prior art suggested the desirability of the modification. *In re Fritch*, 23 USPQ 2d 1780, 1783-84 (Fed. Cir. 1992).

> [T]he level of skill in the art is a prism or lens through which a judge or jury views the prior art and the claimed invention. This reference point prevents these deciders from using their own insight or, worse yet, hindsight, to gauge obviousness. Rarely, however, will the skill in the art component operate to supply missing knowledge or prior art to reach an obviousness judgment. Skill in the art does not act as a bridge over gaps in substantive presentation of an obviousness case, but instead supplies the primary guarantee of objectivity in the process. *Al-Site Corp. v. VSI International, Inc.*, 50 U.S.P.Q.2d 1161 (Fed. Cir. 1999) (citations omitted).

The Federal Circuit has addressed this issue in the case of *In re Rouffet*, 47 U.S.P.Q.2d 1453, 149 F.3d 1350 (Fed. Cir. 1998). In *Rouffet*, the Court noted that virtually all inventions are combinations of old elements. It concluded that:

> an examiner may often find every element of a claimed invention in the prior art. If identification of each claimed element in the prior art were sufficient to negate patentability, very few patents would ever issue. Furthermore, rejecting patents solely by finding prior art corollaries for the claimed elements would permit an examiner to use the claimed invention as a blueprint for piecing together elements in the prior art to defeat the patentability of the claimed invention. Such an approach would be 'an

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> illogical and inappropriate process by which to determine patentability.' *Id.* at 1357.

Even if hypothetically applicable the German *Fischer* publication must be strictly construed and restricted to what is clearly and definitely disclosed.

> "In relying upon a foreign patent to reject a claim, the Patent Office must construe the disclosure of the foreign reference strictly, and restrict the reference to what is clearly and definitely disclosed."
>
> CITC Industries, Inc. v. Manow International Corp., 193 U.S.P.Q. 3656, 368 (S.D.N.Y. 1996).

The *Fischer* reference seeks to measure radioactive daughter nuclides of radon 222 in the air. More particularly, it wished to measure with a double filtration method so that there was a serial arrangement of the filters to thereby separate free and bound radon daughters from other nuclides.

To accomplish this purpose, two different filters 17/1 and 17/2 were separately mounted, whereby "the filter consists for the free portion of a wire grid and the filter for the bound daughters, e.g., of Teflon® or glass fiber fabric." In operation, a sample taking head housing could be extended outward from the housing 4 that supports the measuring instruments 19. Figures 2 and 3 disclose the sampling arrangement with the sampling head 1 extended outward for dust collection. Guide rods 16 and a linear drive mechanism are used to extend the sampling taking head. In this manner, the dust and aerosol particles are both sampled at the same time, with the filters located one behind the other filter in carrying rings 8 and 12.

When the sampling taking head is drawn back within the housing 4, the outer ring 12 positions the filter 17/1 adjacent a measurement instrument 19, while the internal filter member 17/2 of Teflon® or glass fiber fabric is further retracted into the housing to be positioned adjacent

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a second measuring instrument 19 shown in Figure 1. A person of ordinary skill in this field would recognize that this extension and retraction of a sample taking head supporting a radially outward and a radially inward set of aligned filters is the alleged invention. The radiation measurement apparently results from the emission of radiation from the collected radon dust and accordingly, there is no concern about either the strength of the filter material, nor the choice of the filter material to prevent interference with a measurement instrument making a composition analysis based upon an excitation of unknown components with x-rays to produce a fluorescent x-ray.

There is also no apparent teaching of irradiation with beta rays to measure the concentration and mass of the particulate matter. In fact, two separate filters are utilized for two separate measurements.

The *Fischer* reference, therefore, is deficient in teaching a system that can continuously measure on the same filter spot, both mass and composition measurements. The Office Action recognized these limitations of *Fischer*, but suggested that the system of *Fischer* could then be incorporated into respectively the mass measuring of the *Volkwein et al* reference, and also the composition analysis of the *Thomson et al* reference.

Since *Fischer* was directed to a measurement of a radioactive nuclide, it is not seen why a person cognizant of the problems addressed by *Fischer* would want to incorporate measurement instrumentation that would not serve the purpose of *Fischer*. As mentioned above, by looking at the problems addressed by the present invention and the problems addressed by the *Fischer* reference, an objective view can be obtained as to the existence of a teaching reference.

The *Volkwein et al* also represents an effort to address a particular problem, namely an inexpensive personal sampling apparatus to protect miners in the mining industry from dust

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exposure. As can be readily appreciated, underground extraction of coal and other minerals, have created notorious respiratory problems for miners. The *Volkwein et al* reference is not even suggesting a highly sophisticated and sensitive sampling apparatus, but rather an inexpensive dust dosimeter to enable a greater personal use by the miners. See Column 2, Lines 31-38.

Certainly the problem addressed in the *Volkwein et al* reference is neither related to the present invention nor to the *Fischer* disclosure.

The *Volkwein et al* reference is schematically shown in Figure 2 and includes a pre-collector filter 28 that can be several inches in length. See Column 4, Lines 19-24. The pre-collector is attempting to remove non-respirable dust so that only the respirable dust of health concern can reach a pressure drop measuring filter. An 8 millimeter glass fiber filter 30 is used to collect the respiratory dust and a pressure transducer 16 was positioned to measure any differential pressure across the filter resulting from the accumulation of dust over a period of time.

Thus, the measurement technique is to correlate a differential pressure as shown in Figure 4, with a cumulative amount of dust clogging the glass fiber filter. This may serve the purpose of warning a miner about a substantial amount of dust that may be dangerous to his health, but such a pressure differential method of measuring mass would not be appropriate for multiple measurements over a period of time of minute particulate matter in the air of the present invention.

Also, the glass fiber filter would create problems with any composition analysis of the present invention. Additionally, the *Volkwein et al* reference actually wishes to induce a high degree of an inherent electrostatic charging characteristic. See Column 6, Lines 30-31. Clogging glass filters with small respiratory problem particles without analyzing their

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composition, is to provide a relatively crude warming health monitor. The respiratory problem particles need not have their composition analyzed since it addresses this problem by providing a personal dust dosimeter for a miner. It does not address or recognize the issues sought to be resolved in the present invention. Needless to say, there would be no reason for any person of ordinary skill in the field to seek out the *Volkwein et al* pressure differential mining dust dosimeter for incorporation into the mechanized *Fischer* radioactive gas measurement device.

The *Thomson et al* Statutory Invention Registration H188 was directed to an apparatus for measuring a concentration of elements having an atomic number greater than about 15, that can be suspended in air as solid dust or droplets. See Column 1, Lines 14-17. The *Thomson et al* reference is of interest in irradiating the collected particles with x-rays and specifically proposes using a paper filter. See Column 4, Lines 54-65. As noted, *Thomson et al* contends that ". . . the filter must be composed only of lighter elements, i.e., hydrogen, carbon, oxygen and nitrogen."

The *Thomson et al* reference directly teaches away from the filter material that is utilized in both the *Fischer* and *Volkwein et al* disclosures. It also teaches away from our present filter material, and does not address the advantages of an elongated filter formed of an upper non-woven fabric reinforcing layer and a lower porous layer of fluororesin. Instead, *Thomson et al* teaches a very narrow criteria for selecting only a paper filter.

As can be appreciated, the problems addressed and resolved by each of these diverse references, provide an objective standard that suggests an unconscious collection of references may have been based on hindsight from only the teachings of the present invention. Clearly, none of these references alone or collectively combined, teach a system instrument that provides

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a filter capable of permitting both mass and composition for the collected particulate matter to be measured automatically in one instrument.

Referring to Claim 1 and Claim 14, these features are set forth and would not be obvious over any combination of the cited references. The dependent claims add further distinguishing features.

Claims 4, 17, 18 and 21-23 were rejected over *Fischer*, *Volkwein et al*, *Thomson et al* and *Imai et al* (Japanese Laid-Open Patent Application 2002/239319). Apparently the *Imai et al* reference was cited for its teaching of an antistatic electricity characteristic.

The Office Action did not give any weight to the claim limitation set forth in dependent Claim 18 that the filter material included a predetermined reference material to enable calibration. It is respectfully submitted that this is not simply a functional recitation, but rather, distinctly claim a particular predetermined reference material included in the fiber members, with the predetermined reference material being distinguished from the target material to be collected and that the statement "to enable calibration of the composition analyzing unit" is an explanatory statement of a positive structural limitation. Namely, a filter material containing a predetermined reference material.

As set forth in the MPEP §2173.05(g), "A functional limitation is often used in association with an element, ingredient. . . to define a particular capability or purpose that is served by the recited element, ingredient. . ." Accordingly, it is requested that patentable weight be given to a filter member having a predetermined reference material.

The *Imai et al* reference should also be subject to the problem analysis mentioned above. The filter element of the *Imai et al* reference is shown in a cross-sectional view in Figure 1, and apparently constitutes the inclusion of carbon black as a conductive material 4 in order to prevent

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the adhesion of dust. Apparently these filters are to be subject to a counter or backwash pulse of air to clean the filter. See Paragraph 0013.

A fluororubber or fluororesin 3 is applied to a porous surface layer. Resin particles such as polyethylene are utilized as a sintering resin raw material. The aggregate of this material is heated at 150°C for 30 minutes to create the filter element. Apparently the use of the vulcanization of fluororubber is to provide additional strength to compensate for sintering resins of a fine particle nature that would have low mechanical strength. The end result is to provide a surface electrical resistivity of 1010 ohms/square. While *Imai et al* may be of interest in creating a plastic sintered filter having a cross-sectional shape shown in Figure 1 that apparently is capable of deformation during back pressure, see Paragraph (0019), it is not related to the wire or glass filter of *Fischer*, the glass filter of *Volkwein et al*, or the paper filter of *Thomson et al* and it certainly is not the laminated filter of the present invention.

Needless to say, the *Imai et al* reference does not address any feature of measurement of mass and composition of particles on filter elements.

Claim 19 was further rejected over a combination of *Fischer, Volkwein et al, Thomson et al* and the *Wedding* (U.S. Patent No. 5,317,930).

The *Wedding* reference shows a constant flow rate controller so that a constant volumetric flow rate occurred across a sampler filter, irregardless of the amount of particular material that was deposited on the filter. This feature would render the entire purpose of the *Volkwein et al* reference inoperative. The filter that was utilized was a non-fibrous filter membrane of polytetrafluoroethylene. See Column 6, Lines 10-23. The actual invention recognizes that the use of a non-fibrous thin film porous filter membrane could become clogged,

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and could be resolved by a flow control apparatus that could automatically maintain a constant volumetric flow rate, regardless of filter loading. See Column 8, Lines 4-16.

Thus, the teaching of this reference is to provide an apparatus that disregards the limitations of the filter to maintain a proper pressure drop across the filter, regardless of the particulate loading. The teachings to a person of ordinary skill in this field could be summarized on Column 12, as follows:

> "The principal feature of the invention, as described above, is to provide a method and apparatus for use in circumstances where constant volumetric flow rate has to be maintained, even though the pressure drop across the filter may change significantly during a sampling period."

Thus, this reference does not remove the deficiencies of the above-cited references as teaching references.

The Office action rejected Claims 24 and 25 over *Fischer, Volkwein et al, Thomson et al* and the *Wadsworth et al* (U.S. Patent No. 4,375,718). The *Wadsworth et al* reference was cited for a teaching of a non-woven cloth and a method of making the same.

While the making of electrostatically charged filtration material is disclosed in the *Wadsworth et al* disclosure, it is not seen how such a teaching to make such filters acts as any teaching reference for combining the other references to be applied against our current claims.

Finally, the *Hanson et al* reference was cited in combination with the *Fischer, Volkwein et al* and *Thomson et al* references, to reject Claim 26 and to teach a porous layer of a glass fiber, a reinforcing layer, and purportedly a predetermined reference material. The Office Action cites to a statement in the specification that the filter is a commercially available high efficiency glass fiber filter of a type known in 1971.

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As mentioned in our description of the prior art, Paragraph [0011] Page 3 of our specification, conventional glass fiber can have a tendency to absorb x-rays. The Office Action contended that replacing the filter in the *Fischer* reference would be obvious simply because *Hanson et al* indicates that a large number of different types of individual filter material, such as open cell foam, sintered glass, membrane fibers, organic polymers and carbon fibers existed. *Fischer* wanted to measure the radiation from radon nuclides, and was not concerned about the excitation of a particulate material from an external source of x-rays, and the potential interference by the material of the filter.

Applicant respectfully submits that an objective standard of review would indicate there is still no teaching reference that would make this proposed combination in the cited art.

Applicant has by necessity, reviewed the individual characteristics of each of the cited references, but is collectively using the problem solved analysis approach in an attempt to objectively determine whether or not there is any proper teaching reference for combining three and four references in the manner suggested in the Office Action rejection.

It is respectfully submitted by applicant that our present claims should be allowable over any of the combination of these references.

The amendments to our claims and addition of the new claims further reinforce the patentability of our present invention.

It is believed that the case is now in condition for allowance, and an early notification of the same is requested.

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If the Examiner believes that a telephone interview will help the further prosecution of the present case, the undersigned attorney can be contacted in the listed phone number.

I hereby certify that this correspondence is being transmitted via facsimile to the USPTO at 571-273-8300 on May 16, 2006.

By: Sharon Farnus

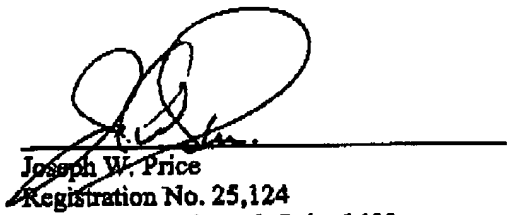
Sharon Farnus

Signature

Dated: May 16, 2006

Very truly yours,

SNELL & WILMER L.L.P.



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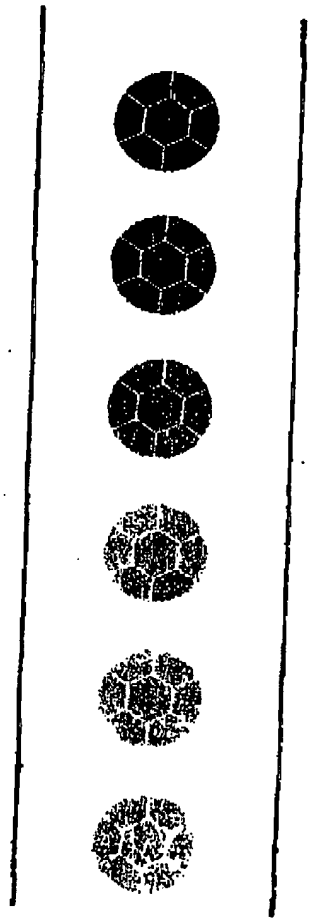

EXHIBIT A

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